



# State Route-73 SR-36 to SR-68 (Redwood Road) Level One Corridor Study

*June 2007*

UDOT  
Planning Section

# Executive Summary

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Corridor studies are the map for the Utah Department of Transportation (UDOT) and local governments to identify, evaluate, and set priorities for the statewide transportation system. They provide information to develop regional and statewide long-range transportation plans which, in turn, provide projects to short-range transportation improvement programs.

The State Route-73 (SR-73) Corridor Study begins at milepost 0.0 in Tooele County, Utah at SR-36 and ends at SR-68, also known as Redwood Road, at approximately milepost 36.46. SR-73 is designated by UDOT's Functional Classification as a Rural Minor Arterial from milepost 0.0 to milepost 20.0, as an Urban Minor Arterial from milepost 20.0 to milepost 30.0 and as an Other Principal Arterial from milepost 30.0 to milepost 36.46. Because of the length of the corridor and the variability of traffic volume and development, it has been divided into three segments. The segments are based upon historic traffic characteristics and the intensity of commercial and residential development.

The three main concerns with SR-73 are safety for Segment 1, capacity improvements for Segments 2 and 3, and a Corridor Management Agreement for part of Segment 3.

The expected accident rate was exceeded every year from 2002 to 2005 in Segment 1 (milepost 0.0 to milepost 20.86). Further analysis has shown that 70 percent of the accidents in Segment 1 were single vehicle roadway departure crashes, and the remaining 30 percent were either head-on collisions or wildlife related. There are no shoulders in this segment, and steep slopes are present in the clear zone at various locations, which may play an important role in the observed accident rate. UDOT Planning may want to consider recommending to UDOT Traffic and Safety that a safety study be performed on SR-73.

Traffic analysis has shown that future travel demand will exceed capacity in Segments 2 and 3 of the corridor. Mountainland Association of Governments (MAG) has planned major capacity improvements for part of the corridor in Segment 2 and the whole of Segment 3 (milepost 30.76 to milepost 36.46). In this study, Segment 2 is defined as milepost 20.86 to milepost 30.76. MAG plans to widen the portion of Segment 2 from milepost 26.22 to 30.22. The corridor is planned to be widened to a 4-lane highway from milepost 26.22 to milepost 36.46 by the year 2030. Thereafter, MAG plans to convert SR-73 to a 6-lane expressway from milepost 33.2 to milepost 36.46.

A Corridor Management Agreement between UDOT and Eagle Mountain City exists for a part of Segment 3. The agreement allows for the installation of five new signals within this segment.

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# 1 IDENTIFICATION OF TRANSPORTATION CORRIDOR STUDY AREA

The Utah Department of Transportation's (UDOT) objective of corridor studies is to develop a best-practice management strategy of the overall statewide transportation system through data collection and analysis of the individual corridors of which it is comprised. Corridor studies investigate conditions of a route and develop possible transportation solutions. They provide an opportunity for UDOT and local government(s) to discuss the corridor and how the corridor does or does not serve their interests or plans. This process may identify strategies in which the corridor can best serve both state and local government interests. Corridor plans are developed from the studies and identify which possible improvements may be needed to improve Utah's transportation system into the future. Corridor plans are the map for UDOT to identify, evaluate, and set priorities for the corridor transportation system. They provide information to develop regional and statewide long-range transportation plans for the 20 plus year horizon which, in turn, provide projects to short-range transportation improvement programs for a six year planning horizon.

Corridor planning is UDOT's program for managing its transportation systems, i.e. the state-administered portion of the overall network, for the long-range plan horizon, and for establishing a vision of corridor needs beyond that. Each corridor study area includes the transportation corridor – the geographic area that influences its performance – in addition to the transportation systems and facilities that make up the corridor.

UDOT has developed and is continuing to refine a statewide highway project prioritization system. A number of factors and issues contribute to a project's priority including those related to safety criteria, capacity, pavement management, and bridge sufficiency. This system is used to determine which projects should receive priority status and to assist in establishing a system-wide needs list and long-range plan. Individual corridor plans are one of UDOT's main methods to define corridor and system needs. The proposed projects identified by corridor studies may be primarily focused on preservation, safety, system management, or mobility.

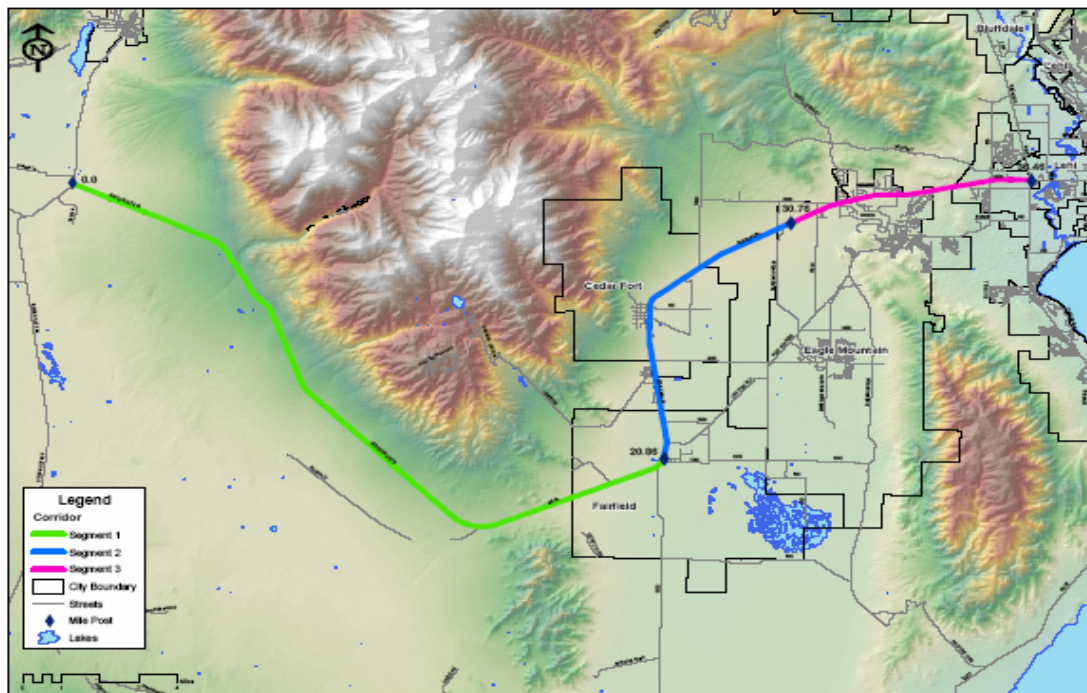
## 1.1 Corridor Description

The SR-73 Corridor Study begins at milepost 0.0 in Tooele County, Utah at SR-36 and ends at milepost 36.46 at SR-68, also known as Redwood Road, in Utah County. Due to the length of the corridor and the variability of traffic volume and development, the corridor has been divided into three segments. The segments are based upon historic traffic characteristics and the intensity of commercial and residential development.

- Segment 1 begins at milepost 0.0 and ends at milepost 20.86 at 1680 North near the Fairfield Cemetery. Traffic volume has historically been low, and there is no commercial or residential development in this segment.
- Segment 2 begins at milepost 20.86 and ends at milepost 30.76 at 1180 East via 8700 North in Eagle Mountain. Historic traffic volume in this segment was slightly higher than in Segment 1 but lower than in Segment 3. Segment 2 is more commercially and residentially developed than Segment 1 but less developed than Segment 3. The eastern portion of this segment has huge growth potential for residential and commercial development. Eagle Mountain's future land use plan shows development along the frontage of SR-73 through the entire city limits.
- Segment 3 begins at milepost 30.76 and ends at milepost 36.46 at its intersection with SR-68. This segment has historically had a higher rate of population and employment growth on property adjacent to SR-73 and also the highest traffic volumes of the three segments of SR-73. Saratoga Springs is one of the fastest growing cities in Utah. The entire Segment 3 will probably experience build-out of residential and commercial development along the frontage of the roadway.

Figure 1 shows a map of the SR-73 corridor with the three defined milepost segments.

**Figure 1 – SR-73 Corridor with Milepost Segments**



SR-73 is primarily a two lane facility. Portions of Segments 2 and 3 have shoulders and a center turn lane. There are two traffic signals in the 36.46 miles of roadway, and the posted speed limit ranges from 45 to 65 mph on the corridor. The UDOT right-of-way averages 150 feet, and there are approximately 60 driveways and streets.

## **1.2 Environmental, Cultural, and Historical Locations within the Corridor**

The Tooele Army Depot, which lies to the southwest of SR-73, is an area of environmental concern because the Tooele Chemical Agent Disposal Facility is located there. The disposal facility is designed to destroy chemical weapons stockpiled at this depot. The Five Mile Pass OHV Area is used by off-road vehicle enthusiasts and has a 4-wheeler trail amongst rolling rocky hills covered with sage brush and juniper. A major historic location along the corridor is the Camp Floyd Stagecoach Inn State Park and Museum located in Fairfield. This state park contains remnants of a fort used by American troops from 1858 to 1861. Camp Floyd was also a stop for the Pony Express, a mail carrier service founded in 1860 which became obsolete two years later.

## **1.3 Historical Perspective of the Corridor**

This corridor and other roads in the area were developed by approximately 3,500 American troops to provide access to their campsite near modern day Fairfield. President James Buchanan sent these troops to monitor Mormon settlements in 1858. Recently, different cities along the corridor such as Eagle Mountain and Saratoga Springs have experienced rapid growth, increasing the amount of traffic that uses SR-73. Today, this corridor primarily serves as the connection between Tooele County and northern Utah County in addition to providing access to several communities.

## **1.4 Population, Employment, and Demographics**

SR-73 begins at milepost 0.0 in Tooele County at SR-36 and provides access to the towns of Ophir, Fairfield, and Cedar Fort. It also provides access to the cities of Eagle Mountain and Saratoga Springs. Most of Segment 1 lies within unincorporated areas of Tooele and Utah Counties. Tooele County is expected to continue to grow. Most of that growth will probably be in the incorporated cities. The Town of Ophir is the only incorporated town in Segment 1. According to the state population projections shown in Table 1, population growth in the Town of Ophir will be minimal in the future. Segment 2 lies within the towns of Fairfield and Cedar Fort. Compared to Ophir and the unincorporated areas of Tooele and Utah Counties, Fairfield and Cedar Fort will experience higher population growth in the future. The highest growth in population is anticipated in Segment 3 within the cities of Eagle Mountain and Saratoga Springs.

<b>Table 1 – Population</b>							
	2000	2010		2020		2030	
	Population	Population	10 Year Change	Population	10 Year Change	Population	10 Year Change
Tooele County	40,735	67,150	65%	95,696	43%	112,722	18%
Ophir	23	28	22%	26	-7%	23	-15%
Fairfield	127	141	11%	546	287%	1,010	85%
Cedar Fort	341	397	16%	1,914	382%	6,217	325%
Eagle Mountain	2,157	14,687	581%	30,378	107%	53,870	77%
Saratoga Springs	1,003	11,373	1,029%	23,373	106%	35,321	51%

*Source: Governor's Office of Planning and Budget, February, 2007*

The only major employer in Segment 1 is the Tooele Army Depot. In Segments 2 and 3, very few employers exist, except for a few retail businesses and low-intensity agricultural activities. The land use plans for both Eagle Mountain and Saratoga Springs plan for commercial development at strategic locations along the corridor. As more houses are constructed, more commercial development will take place along the corridor to provide retail services. However, employment will continue to be located primarily in the metropolitan areas outside of this corridor.

## 2 ANALYSIS OF EXISTING CONDITIONS

The existing conditions analysis summarizes the existing land use patterns, traffic patterns/characteristics, environment, utilities, right-of-way, safety, geometric design, structures, maintenance, pavement condition, alternative modes and efficient intermodal transfer, access management strategies, and other relevant studies.

### 2.1 Analysis Area

The analysis area begins at milepost 0.0 in Tooele County at SR-36 and ends at milepost 36.46 at SR-68 in Utah County.

#### 2.1.A Land Use Patterns

Most of the land along SR-73 is vacant, especially in Segment 1. In Segment 1, other than vacant land, the only other land use identified is the Five Mile Pass Recreational Area for off-highway vehicles (OHVs) which is located at milepost 18. In Segment 2, low intensity agricultural, residential, and commercial activities take place. In Segment 3, there is medium-intensity residential, low-intensity commercial, and medium-intensity industrial activity.

Table 2 – Land Use	
Segment	Land Use
1	Vacant, one recreational area
2	Low-intensity agriculture, low-intensity residential, and low-intensity commercial
3	Medium-intensity residential, low-commercial, medium-intensity industrial

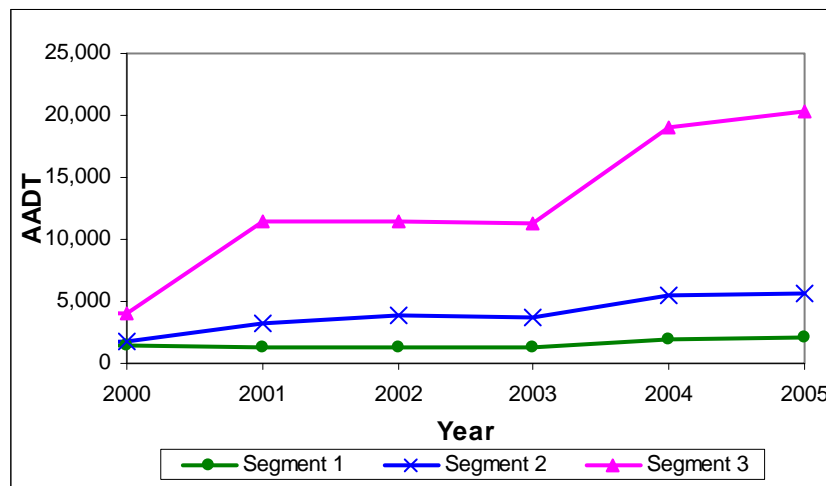
#### 2.1.B Traffic Patterns/Characteristics

The major traffic generators along this corridor are residential developments in Eagle Mountain and Saratoga Springs and a few commercial enterprises such as Giant Brothers Multimedia and Staker Parson Companies earth extraction operation.

Historic traffic has shown that there was virtually no growth prior to 2000. Since 2000, there has been a positive growth in traffic on SR-73, as shown in Figure 2. Traffic in Segment 1 was the lowest compared to the other segments, and its growth was minimal.

This segment experienced a yearly growth of 10 percent which is an average of 68 additional AADT per year from 2000 to 2005. Historic traffic trends show that traffic in Segment 2 was slightly higher than in Segment 1 but lower than in Segment 3. Segment 2 experienced an unusual increase of 87 percent in traffic volume from 2000 to 2001, but, generally, traffic in Segment 2 grew at a rate of 47 percent per year. This represents, on average, an increase of 205 AADT per year from 2000 to 2005. Segment 3 experienced the highest traffic volume in the past compared to the other two segments along the corridor. Traffic growth in Segment 3 was 81 percent from 2000 to 2005, averaging an increase of 700 AADT per year. There were two periods with dramatic increases in traffic volume in Segment 3: an 87 percent increase from 2000 to 2001 and a 68 percent increase from 2003 to 2004.

**Figure 2 – Historic Traffic Trends**



Source: *Traffic on Utah Highways*

### 2.1.C Environment

The following contains screening level information regarding various environmental topics.

#### Economic

The City of Eagle Mountain has seen tremendous residential growth in the last five years. Since there are few commercial activities in this area, most of the local residents have to commute to other parts of the state to find employment and services. Eagle Mountain residents use SR-73 as the main road for commuting purposes. Demand on this road continues to increase as more developments take place along the corridor and as Eagle Mountain grows. According to UDOT's Truck Traffic on Utah Highways report in 2005, truck traffic on SR-73 varied from seven percent near the intersection of SR-68 (Redwood Road) to 24 percent near the intersection of SR-36.

Air Quality

SR-73 is located in Utah and Tooele Counties. Utah County is a Non-attainment Area for Particulate (PM10).

Noise

In Segment 1, noise pollution is not an issue of major concern because traffic is low, and there are no residential or commercial developments. As noted earlier, traffic volume and development increase in Segments 2 and 3. There are no measures implemented in these two segments to address noise related issues.

Water Quality

Water runoff from Manning Canyon has brought arsenic to SR-73 from milepost 20 to milepost 22. This arsenic has been identified and is being monitored. Arsenic came from gold extraction from ore by the Mercury Gold Mining and Milling Company.

Wetlands

The National Wetlands Inventory (NWI) has identified less than one acre of wetlands along the entire corridor. The location of the identified wetland consists of 0.9 acres located on the northeast corner of the intersection of SR-73 and 800 West in Saratoga Springs.

Wildlife

Rocky Mountain Elk and Mule Deer both have critical habitats north of the SR-73 corridor in Tooele County near the Oquirrh Mountains, approximately 1,000 feet from the highway.

Threatened or Endangered Species

The following four tables contain Tooele and Utah County animal and plant species that are or have been listed as one or more of the following: Federally-listed or candidate species under the Endangered Species Act (S-ESA), Wildlife species of concern (SPC), and Species receiving special management under a Conservation Agreement in order to preclude the need for Federal listing (CS). The animals and plants listed below are found in Tooele or Utah County but may not be specific to the corridor of SR-73.

<b>Table 3 – Animal Species in Tooele County of S-ESA, SPC, or CS Status</b>		
Common Name	Scientific Name	State Status
American White Pelican	<i>Pelecanus Erythorhynchus</i>	SPC
Bald Eagle	<i>Haliaeetus Leucocephalus</i>	S-ESA
Bobolink	<i>Dolichonyx Oryzivorus</i>	SPC
Bonneville Cutthroat Trout	<i>Oncorhynchus Clarkii</i> Utah	CS
Bonytail	<i>Gila Elegans</i>	S-ESA
Burrowing Owl	<i>Athene Cunicularia</i>	SPC
California Floater	<i>Anodonta Californiensis</i>	SPC
Columbia Spotted Frog	<i>Rana Luteiventris</i>	CS
Dark Kangaroo Mouse	<i>Microdipodops Megacephalus</i>	SPC
Eureka Mountainsnail	<i>Oreohelix Eurekaensis</i>	SPC
Ferruginous Hawk	<i>Buteo Regalis</i>	SPC
Grasshopper Sparrow	<i>Ammodramus Savannarum</i>	SPC
Greater Sage-Grouse	<i>Centrocercus Urophasianus</i>	SPC
Kit Fox	<i>Vulpes Macrotis</i>	SPC
Least Chub	<i>Iotichthys Phlegethontis</i>	CS
Lewis's Woodpecker	<i>Melanerpes Lewis</i>	SPC
Long-Billed Curlew	<i>Numenius Americanus</i>	SPC
Lyrate Mounmtainsnail	<i>Oreohelix Haydeni</i>	SPC
Northern Goshawk	<i>Accipiter Gentilis</i>	CS
Northwest Bonneville Pyrg	<i>Pyrgulopsis Variegata</i>	SPC
Preble's Shrew	<i>Sorex Preblei</i>	SPC
Pygmy Rabbit	<i>Brachylagus Idahoensis</i>	SPC
Short-Eared Owl	<i>Asio Flammeus</i>	SPC
Southern Bonneville Springsnail	<i>Pyrgulopsis Transversa</i>	SPC
Southern Tightcoil	<i>Ogaridiscus Subrupicola</i>	SPC
Townsend's Big-Eared Bat	<i>Corynorhinus Townsendii</i>	SPC
Utah Physa	<i>Physella Utahensis</i>	SPC
Yellow-Billed Cuckoo	<i>Coccyzus Americanus</i>	S-ESA

S-ESA (Federally-listed or candidate species under the Endangered Species Act)

SPC (Wildlife species of concern)

CS (Species receiving special management under a Conservation Agreement in order to preclude the need for Federal listing)

Source: State of Utah, Natural Resource, Division of Wildlife Resources, Sensitive Species by County, 2006.

<b>Table 4 – Plants in Tooele County of S-ESA, SPC, or CS Status</b>		
Common Name	Scientific Name	State Status
Deseret Milkvetch	<i>Astragalus Desereticus</i>	Rare
Ute Ladies'-Tresses,	<i>Spiranthes Diluvialis</i>	Rare

Source: State of Utah, Natural Resource, Division of Wildlife Resources, Plants.

<b>Table 5 – Animal Species in Utah County of S-ESA, SPC, or CS Status</b>		
Common Name	Scientific Name	State Status
American White Pelican	<i>Pelecanus Erythorhynchus</i>	SPC
Bald Eagle	<i>Haliaeetus Leeucocephalus</i>	S-ESA
Black Swift	<i>Cypseloides Niger</i>	SPC
Bluehead Sucker	<i>Catostomus Discobolus</i>	CS
Bobolink	<i>Dolichonyx Oryzivorus</i>	SPC
Bonneville Cutthroat Trout	<i>Oncorhynchus Clarkii Utah</i>	CS
Brown (Grizzly) Bear	<i>Ursus Arctos</i>	S-ESA
Burrowing Owl	<i>Athene Cunicularia</i>	SPC
California Floater	<i>Anodonta Californiensis</i>	SPC
Colorado River Cutthroat Trout	<i>Oncorhynchus Clarkii Pleuriticus</i>	CS
Columbia Spotted Frog	<i>Rana Luteiventris</i>	CS
Desert Valvata	<i>Valvata Utahensis</i>	S-ESA
Eureka Mountainsnail	<i>Oreohelix Eurekaensis</i>	SPC
Ferruginous Hawk	<i>Buteo Regalis</i>	SPC
Fringed Myotis	<i>Myotis Thysanodes</i>	SPC
Greater Sage-Grouse	<i>Centrocercus Urophasianus</i>	SPC
June Sucker	<i>Chasmistes Liorus</i>	S-ESA
Kit Fox	<i>Vulpes Macrotis</i>	SPC
Least Chub	<i>Iotichthys Phlegethontis</i>	CS
Leatherside Chub	<i>Gila Copei</i>	SPC
Lewis's Woodpecker	<i>Melanerpes Lewis</i>	SPC
Long-Billed Curlew	<i>Numenius Americanus</i>	SPC
Northern Goshawk	<i>Accipiter Gentilis</i>	CS
Roundtail Chub	<i>Gila Robusta</i>	CS
Short-Eared Owl	<i>Asio Flammeus</i>	SPC
Smooth Greensnake	<i>Opheodrys Vernalis</i>	SPC
Southern Bonneville Springsnail	<i>Pyrgulopsis Transversa</i>	SPC
Spotted Bat	<i>Euderma Maculatum</i>	SPC
Three-Toed Woodpecker	<i>Picoides Tridactylus</i>	SPC
Townsend's Big-Eared Bat	<i>Corynorhinus Townsendii</i>	SPC
Utah Physa	<i>Physella Utahensis</i>	SPC
Western Red Bat	<i>Lasiurus Blossevillei</i>	SPC
Western Toad	<i>Bufo Boreas</i>	SPC
White-Tailed Prairie-Dog	<i>Cynomys Leucurus</i>	SPC
Yellow-Billed Cuckoo	<i>Coccyzus Americanus</i>	S-ESA

Source: State of Utah, Natural Resource, Division of Wildlife Resources, Sensitive Species by County, 2006.

<b>Table 6 – Plants in Utah County of S-ESA, SPC, or CS Status</b>		
Common Name	Scientific Name	State Status
Ute Ladies'-Tresses,	<i>Spiranthes Diluvialis</i>	Rare

Source: State of Utah, Natural Resource, Division of Wildlife Resources, Plants.

Flood Plain

The Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map (FIRM) showed no designated flood zones within the corridor.

Wild and Scenic Rivers

According to the National Wild and Scenic Rivers System website, there are no wild and scenic rivers within the vicinity of the corridor.

Historic and Archeological Preservation

It is possible that historic and archeological resources are present along SR-73 in the town of Fairfield because of Fairfield's early military history. Typically, cultural resource assessments are performed once a project is identified. This corridor would need to be assessed in order to identify preservation areas. The Camp Floyd Cemetery exists near milepost 21, just a few blocks from the right-of-way for SR-73.

Fossil Preservation

No known fossil preservation is being conducted along the corridor.

Hazardous Waste Sites

The Tooele Chemical Agent Disposal Facility is located at the Tooele Army Depot, just south of SR-73 from milepost 3.5 to milepost 6.5. This facility destroys chemical weapon stockpiles located at the depot.

Visual Impacts

In the locations along SR-73 that might be widened or improved by UDOT, no long-term visual impacts due to construction, widening, or improving are expected. However, landscaping and restoration of disturbed vegetation during construction will be needed.

Prime and Unique Farmlands

According to the Utah County Community Development Department, no Agricultural Protection Areas have frontage on SR-73. The Church of Jesus Christ of Latter-day Saints owns properties that are Agricultural Protection Areas, but they are located away from the right-of-way of SR-73. SR-73 in Tooele County does not contain any Agricultural Protection Areas according to Tooele County Engineering.

Section 4(f) Properties

The U.S. Department of Transportation's Section 4(f) law (49 USC 303) states that federal funds may not be approved for projects that use land from a significant publicly owned park, recreation area, wildlife or waterfowl refuge, or any significant historic site. Exceptions may be permitted if it is determined that there is no feasible and prudent alternative to the use of land from such

properties and the action includes all possible planning to minimize harm to the property resulting from such use. The following list includes possible Section 4(f) designations

<b>Table 7 – Possible Section 4(f) Designations</b>	
Location	Milepost
Tooele Army Depot	4
Five-mile Pass Recreation Area	18
Camp Floyd Stagecoach Inn State Park and Museum in Fairfield	20.86
Camp Floyd Cemetery	21

### 2.1.D Utilities

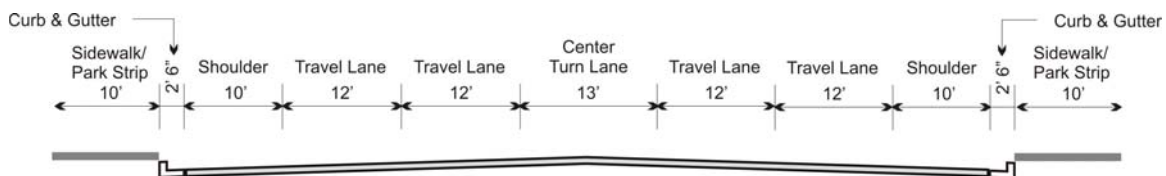
The three segments of the corridor contain standard utilities common to an urban environment such as communication, natural gas, power, sewer, and water lines.

### 2.1.E Right-of-Way

Right-of-way maps provided by UDOT Region 3 showed that the right-of-way is 150 feet in Utah County, from milepost 15.75 to milepost 36.46. Based on the right-of-way maps, in the future there is enough room to accommodate the cross-section for a state standard arterial shown in Figure 3. It is important to note that the overhead utility lines which run parallel to the corridor will need to be moved if the road is widened.

<b>Table 8 – Right-of-Way Width</b>	
Segment	Right-of-Way (ft)
1 (mp 0.0 – mp 15.75) (mp 15.75 – mp 20.86)	Not Available 150
2	150
3	150

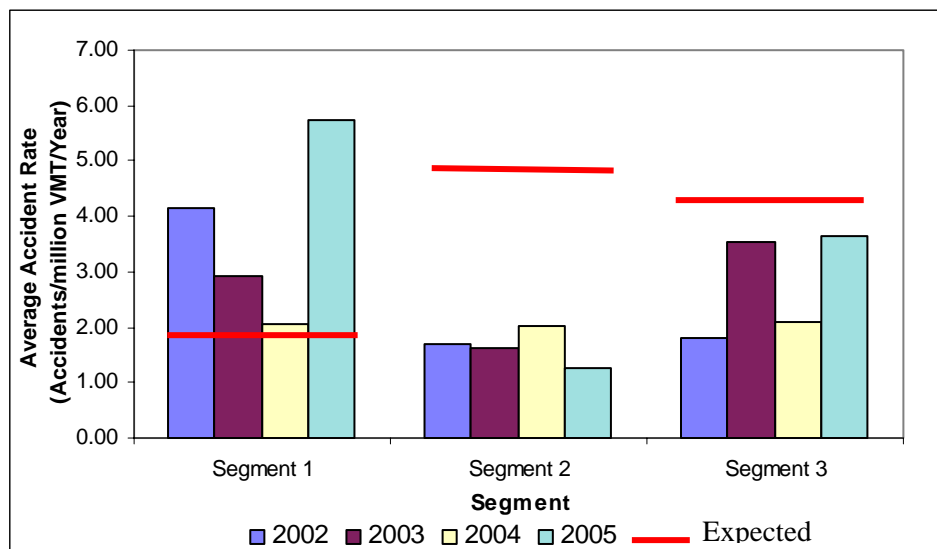
**Figure 3 – State Standard Arterial Cross-Section (106 foot right-of-way)**



### 2.1.F Safety

Figure 4 shows the average and expected accidents rates over a four year period. Expected accident values for each segment are also shown as provided by UDOT for the years 2002 to 2005. Both average and expected accident rates are reported in number of accidents per million Vehicle Miles Traveled (VMT) per year. For an urban road, expected accident rates depend on the functional class of the roadway, AADT, and the population in close proximity of the roadway. For a rural road, expected accident rates depend only on the functional class of the roadway and the AADT. For these reasons, the expected accident rate varies from segment to segment. Segment 1 has the lowest expected accident rate, but the highest actual rate. This could be because Segment 1 does not have any shoulders and single vehicle roadway departure crashes are high in Segment 1. While Segment 2 has the lowest average accident rate, it also has the highest expected accident rate. Segment 2 has accesses to many residential subdivisions and only one traffic signal.

**Figure 4 – Average and Expected Accident Rates**



The accident rate for Segment 1 decreased every year from 2002 to 2004. In 2005, however, the rate increased, possibly because historic traffic trends have shown a slight increase in traffic volumes in Segment 1 in 2005. Segment 2 accident rates did not fluctuate noticeably during the four years analyzed, even though traffic increased during this time period. In Segment 3, the accident rate fluctuated from year to year, although there was a major increase in the amount of traffic from 2002 to 2005.

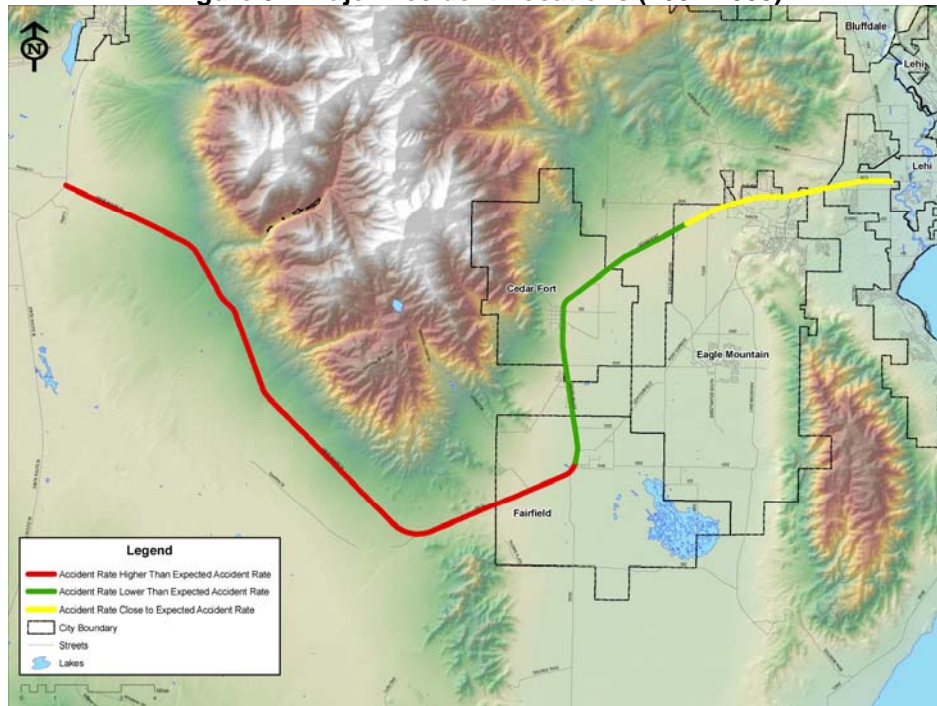
The expected accident rate was exceeded every year from 2002 to 2005 in Segment 1. This is an indication that UDOT Traffic and Safety Department may want to study Segment 1 of SR-73 for possible mitigation strategies. Approximately 30 percent of the total accidents in this corridor occurred in Segment 1. However, this segment experienced low AADT compared to the other segments. Further analysis has shown that 70 percent of the accidents in Segment 1 were single vehicle roadway departure crashes, and the rest were either head-on collisions or wildlife related. There are no shoulders in this segment, and steep drop offs are present at various locations in the clear zone.

The expected accident rate was not exceeded in Segment 2 or Segment 3. Approximately 25 percent of total accidents occurred in Segment 2, and the majority of these were either single vehicle roadway departure crashes or head-on collisions. The remaining 45 percent of this corridor's accidents occurred in Segment 3. Even though the actual accident rate in Segment 3 was lower than the expected rate, safety at the intersections in Segment 3 could be studied further. This analysis has shown that most of the accidents in this segment occurred at the intersections. Approximately 80 percent of the accidents at intersections were right-angle collisions between left-turning traffic and opposing through traffic. The remaining 20 percent included rear end collisions and T-bone collisions. The values for the expected accident rates plotted in Figure 4 are listed in Table 9.

<b>Table 9 – Expected Accident Rates</b>						
Milepost	AADT (Weighted Average)				Functional Class	Expected Accident Rate (Accidents per million VMT per year)
	2002	2003	2004	2005		
Segment 1	1,141	1,122	1,855	1,967	Rural-Minor Arterial	1.96
Segment 2	4,090	4,020	5,996	6,188	Urban-Minor Arterial	5.25
Segment 3	11,170	10,970	16,400	17,545	Urban-Other Principal Arterial	4.26

*Source: UDOT Traffic & Safety Division*

There are safety concerns in Segment 1 because the actual accidents recorded are greater than those expected for this functional class of road, as shown in Figure 5. The observed accident rate for Segment 3 is less than expected. However, the accidents recorded from this segment were severe in the four years analyzed. Recorded fatalities are shown in Table 10. Other accidents resulted in different types of injuries or, possibly, no injuries.

**Figure 5 – Major Accident Locations (2002-2005)****Table 10 – Fatalities**

Year	Segment 1	Segment 2	Segment 3
2002	0	2	0
2003	0	0	6
2004	0	2	5
2005	0	0	0

### 2.1.G Geometric Design

#### Roadway

The roadway geometrics (travel lanes, lane widths, center turn lanes, intersection additional turn lanes, channelized right turns, paved shoulders, curb and gutter, and sidewalk) along the corridor are inventoried in Table 11. Each of these features affects capacity and safety of the corridor in various ways. For example, turn lanes are necessary to reduce the conflict between the slow speed turning traffic and the high speed through traffic.

<b>Table 11 – Roadway Geometrics</b>			
Feature	Segment 1	Segment 2	Segment 3
Number of Travel Lanes	2	2	2
Lane Widths (feet)	10	12	12
Center Turn Lanes	0%	0%	35%
Intersection Additional Turn Lanes	Yes	Yes	Yes
Channelized Right Turns	No	Yes	Yes
Paved Shoulders*	No	Yes	Yes
Curb, Gutter	0%	0%	40%
Sidewalk	0%	0%	30%

\*Paved shoulders are four feet wide.

### Intersections

SR-73 is not perpendicularly aligned with the following side roads: Faust Road (milepost 16), 1500 North (milepost 20.65), 1180 East (milepost 30), Valley Drive (milepost 32.10), and 800 West (milepost 35.50). The AASHTO Green Book states that for safety and economy, intersecting roads should generally meet at right angles.

### 2.1.H Structures

The Tickville Wash box culvert exists in Segment 2.

### 2.1.I Maintenance

There are no shoulders in Segment 1, and the clear zones are too steep at some locations, leaving no room for emergency parking. UDOT may want to consider constructing shoulders and grading clear zones in order to improve safety. Severe potholing and cracking was observed at milepost 23 and milepost 32.5, as shown in the photos below. Cracking was also observed at other locations in Segments 2 and 3 where saw cuts had been made while widening the road to create turn lanes or shoulders. The cracks were not properly sealed, and the saw cuts are still open, allowing ingress of water into the underlying pavement layers. Rough patching and chip sealing that are wearing out were also observed at various locations. Ground water is monitored from milepost 20 to milepost 22 because of arsenic contamination. Some of the culverts along SR-73 are planned to be widened. Another concern is that private developers are randomly opening accesses to their property along the corridor without an access permit from UDOT. Most of these accesses are not paved, and the continued use of the access points has led to breaking of pavement edges.

**Figure 6 – Potholes and Cracking at Milepost 23****Figure 7 – Potholes at Milepost 32.5**

### 2.1.J Pavement Condition

A 10-year preservation program from 2011 to 2020 is shown in Table 12. Currently, there are no scheduled safety improvements for this corridor.

<b>Table 12 – System Preservation Plan (2011 – 2020)</b>				
Milepost	Element ID	Year	Treatment	Cost
0.00 - 8.70	073P-00000	2017	Major Asphalt Rehabilitation	\$7,449,580
8.70 - 15.79	073P-00870	2015	Major Asphalt Rehabilitation	\$5,004,220
15.79 - 21.04	073P-01580	2012	Major Asphalt Rehabilitation	\$1,242,013
15.79 - 21.04	073P-01580	2020	Chip Seal	\$393,336
21.04 - 25.04	073P-02104	2013	Major Asphalt Rehabilitation	\$1,315,985
25.04 - 31.10	073P-02505	2013	Chip Seal	\$498,167
25.04 - 31.10	0E2298	2015	Repair Culvert	\$195,716
31.10 - 34.54	073P-03110	2013	Major Asphalt Rehabilitation	\$1,416,989
34.54 - 36.45	073P-03455	2013	Functional Repair	\$838,942

Source: UDOT System Preservation Plan 2011-2020

Drainage

A culvert at milepost 25.5 directs water into the front yard of a house. The house has had minor flooding in the past because of the culvert. There were no other drainage issues observed.

Striping and Signing

At some points, lane striping has faded and needs to be reapplied. Culvert signage is not visible or has been removed at points throughout the study area.

**Figure 8 – Example of Visible Old Lane Striping**



### 2.1.K Alternative Modes and Efficient Intermodal Transfer

Evaluating alternative modes of transportation is important to a functional and efficient transportation system. By reviewing modes beyond traditional highway usage as potential solutions, UDOT can move forward in providing a best-practice transportation system.

- Pedestrian – Pedestrian activity in Segments 1 and 2 is rare because of the sparse population. There is more development in Segment 3 which increases pedestrian activity. Sidewalks will be needed in the future as development becomes more dense, especially near Redwood Road.
- Bicycle – There are no bike lanes along SR-73. Bike activity is very minimal on this route, but is likely to occur in Segment 3 where there is some residential and commercial development. Paved shoulders in this area (milepost 20.86 to milepost 36.46) are four feet wide and need to be widened to eight feet to safely provide for bikes and to meet current standards.
- Transit – Currently, there is no transit service within this corridor.

Planning and coordination should also continue to take place in other systems of transportation including air and truck transportation, pipelines, and railroads. UDOT plays an important coordination role with each of these, particularly in ensuring efficient intermodal transfer with the highway system.

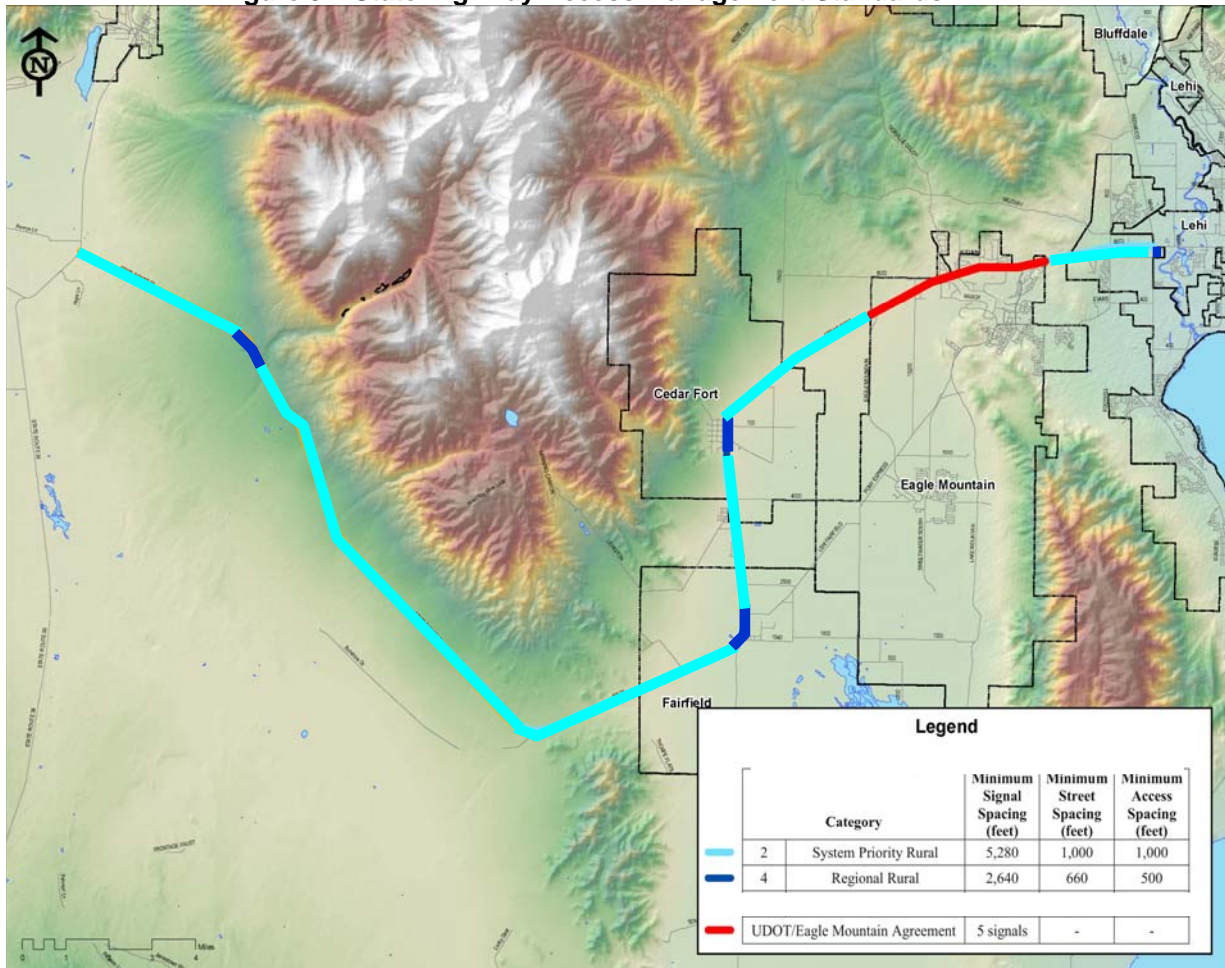
- Aviation – There are no commercial aviation services along SR-73.
- Truck – Utah has recently approved the Cedar Valley Intermountain Regional Land Fill for construction and demolition materials in the southern city limits of Fairfield. Mayor Gillies has indicated that as many as 40 to 50 semi-trucks per day will be traveling to and from the land fill on SR-73. There is also a turf farm near Fairfield that produces as many as 15 to 20 semi-trucks per day. For these turf hauling semi-trucks, turning from 1540 North onto SR-73 is very difficult and potentially dangerous because they have to pull into the other lane of travel to make the turn.
- Pipeline – There is a high pressure gas pipeline running along the road between milepost 25 and milepost 36.45.
- Railroad – There are no highway-rail grade crossings.

### 2.1.L Access Management Strategies

UDOT adopted Administrative Rule R930-6 to accommodate utilities and to control and protect state highway rights-of-way. The state highway access standards contain nine different categories. SR-73 has two access management categories in the study area. They are shown in Figure 9. However, the current access points along the corridor do not meet the access management standards. Access management deficiencies are detailed in Section 5.2.A (Corridor Wide Recommendations) of this document.

A corridor management agreement between UDOT and Eagle Mountain City exists for a part of Segment 3. The agreement allows for the installation of five new signals within this segment.

Figure 9 – State Highway Access Management Standards



Source: UDOT Administrative Rule R930-6, May, 2006

## 2.1.M Relevant Studies

### Traffic Signals and Traffic Control Devices

There are only two signalized intersections along this route: Ranches Parkway (milepost 33.22) and Redwood Road (milepost 36.46). During a recent p.m. peak site visit, long queues for westbound through traffic were observed at the Redwood Road intersection. There were no issues noted at Ranches Parkway. However, because a large scale commercial development is planned at this intersection, preserving right-of-way at the Ranches Parkway intersection will provide for the opportunity for a grade separated interchange in the future. Smooth operations were observed at the unsignalized intersections along the route because turn lanes have been provided.

### 3 FUTURE CONDITIONS FORECAST

In this section, future conditions for land use, population, travel demand, and mobility needs will be discussed to show potential growth and its impacts on road conditions.

#### 3.1 Analysis Area

The analysis for the SR-73 Corridor Study begins at milepost 0.0 in Tooele County at SR-36 and ends at SR-68 at approximately milepost 36.46.

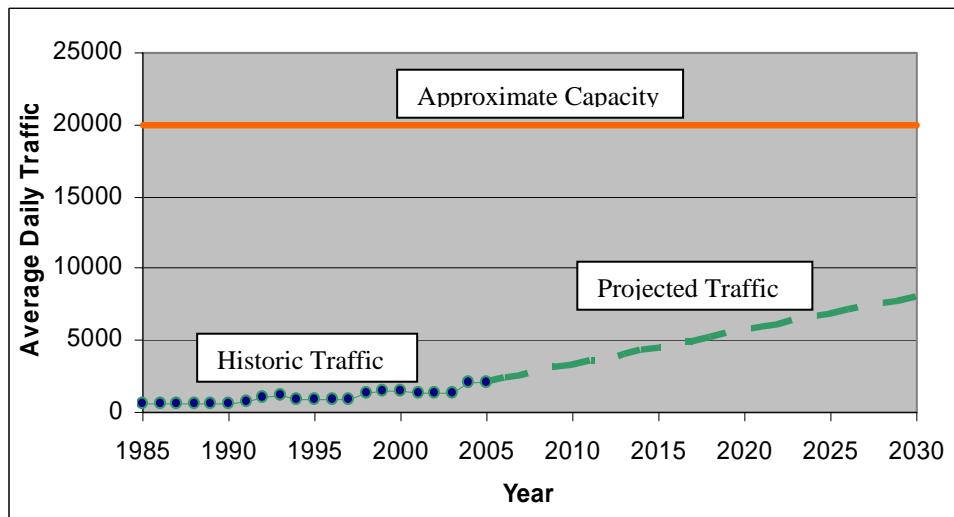
##### 3.1.A Land Use Plans and Population Growth

Future land use along this corridor in Utah County is expected to be residential, commercial and industrial. In Tooele County, most of the land is expected to remain undeveloped.

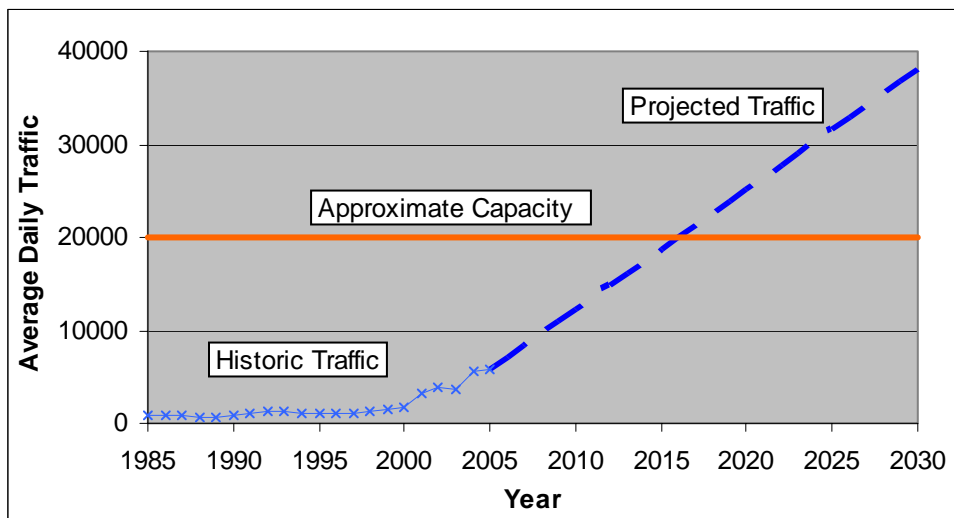
##### 3.1.B Travel Demand Growth

UDOT's Traffic on Utah Highways was used to project traffic volume for Figure 10. Traffic volume was projected to reflect Mountainland Association of Governments (MAG) 2030 volume estimates as shown in Figures 11 and 12. Travel modeling took into consideration major capacity improvements planned by MAG along SR-73. Socio-economic data was also considered in travel demand modeling.

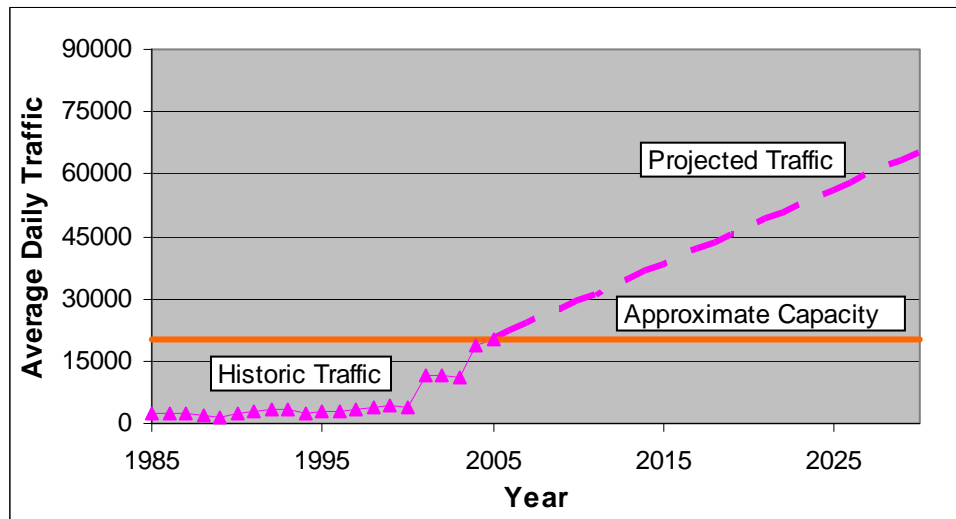
SR-73 is currently a two-lane highway, and the capacity is estimated to be 20,000 vehicles per day. Figure 10 shows that there are no capacity problems in Segment 1. Figures 11 and 12 show that Segments 2 and 3 will need to be widened to accommodate projected traffic. MAG has planned major capacity improvements along SR-73 that will be executed in phases as listed in Table 14 (section 5).

**Figure 10 – Traffic Forecast for Segment 1**

Source: Traffic on Utah Highways; InterPlan

**Figure 11 – Traffic Forecast for Segment 2**

Source: Traffic on Utah Highways; InterPlan

**Figure 12 – Traffic Forecast for Segment 3**

Source: Traffic on Utah Highways; InterPlan

**Table 13 – Projected Traffic Volumes**

Year	Segment 1	Segment 2	Segment 3
2005	2,100	5,715	20,305
2015	4,500	18,500	38,000
2030	8,000	38,000	65,000

### 3.1.C Present and Future Mobility Needs

The present and future mobility needs of the corridor are largely related to automobile traffic, such as widening segments of the roadway to meet travel demand. However, a discussion should be held between UDOT and the various cities along the corridor to establish different corridor preservation techniques for future interchanges and access management strategies for capacity preservation.

## **4 PUBLIC INVOLVEMENT**

State Route 73 begins in eastern Tooele County at SR-36 and travels through northern Utah County and the communities of Fairfield, Cedar Fort, Eagle Mountain, Saratoga Springs, and Lehi. The study limits for this study ended at SR-68 in Saratoga Springs. These communities were involved in the study through participation in a corridor drive and a public open house.

### **4.1 History of Public Involvement**

The corridor drive took place on January 31, 2007. Representatives from Tooele and Utah Counties were invited along with representatives from Fairfield, Cedar Fort, Eagle Mountain, Saratoga Springs, UDOT Region Three, and UDOT Planning. During the drive, several comments were made about future maintenance projects and about coordination between UDOT and the cities. This meeting provided a formal opportunity for communication to occur between the professional city staffs and UDOT Maintenance staff. A representative from the UDOT Planning Department was also present.

The public open house took place from 4:30 p.m. to 7:00 p.m. on April 18, 2007 at the Eagle Mountain City offices. At least 54 people participated in the open house, and 31 written comments were received (see Appendix).

### **4.2 Outreach Methods and Tools Used**

The public involvement coordinator for UDOT Planning worked with Region Three's public involvement coordinator to plan the public open house. A press release was written and sent to local newspapers, and the announcement was placed in utility billing notices for Eagle Mountain and Saratoga Springs. Announcements were also provided to Ophir, Fairfield, and Cedar Fort mayors for distribution to the residents.

### **4.3 Groups Involved and Summary of Contacts Made**

Most of the participation was from residents of the communities and professional staff of Eagle Mountain and Saratoga Springs. They visited with UDOT personnel, and some submitted written comments.

#### **4.4 Summary of Public Concern**

Most of the comments centered on the following four issues:

- The immediate need for a secondary access to Eagle Mountain from SR-68 (Redwood Road)
- Congestion from Eagle Mountain city limits to I-15
- Safety along SR-73 and at the intersections
- Trash along SR-73 from SR-68 to Fairfield

## 5 CORRIDOR-WIDE RECOMMENDATIONS

UDOT has four strategic goals upon which their transportation work is centered. The four strategic goals are listed below.

- Take Care of What We Have
- Make the System Work Better
- Improve Safety
- Increase Capacity

The deficiencies that are identified in this report are listed under the four goals.

### 5.1 Take Care of What We Have

#### 5.1.A Maintenance and Operations Deficiencies

Maintenance and operations deficiencies that have been identified include the following:

1. In Segment 1 shoulders could be constructed, and slope flattening in the clear zone could be done at some locations.
2. At milepost 23 and milepost 32.5, severe potholing and cracking could be given urgent attention.
3. Saw cuts could be properly sealed in Segments 2 and 3 (milepost 20.86 to milepost 36.46).
4. Rough patching observed at various locations could be corrected.
5. A culvert at milepost 25.5 that shoots water directly into the front yard of a house could be redirected.
6. Ground water contaminated with arsenic from milepost 20 to milepost 22 should continue to be monitored.

#### 5.1.B Right-of-way

Information obtained from the right-of-way maps indicates that the right-of-way is 150 feet in Utah County from milepost 15.75 to milepost 36.46. Thus, there is enough room to accommodate the cross-section for a state standard arterial roadway (106 feet).

## 5.2 Make the System Work Better

### 5.2.A Access Management

Access management deficiencies that have been identified include:

1. 100 North in Cedar Fort has an offset intersection at SR-73.
2. Many driveways being used by private land owners to access their property have not been approved by UDOT. Continued enforcement will be necessary to ensure the continued safety and reliable maintenance of SR-73.
3. 800 North and Canyon Wash Drive are access points closer than the required standard for this category of road (1000 feet).

Note: Access management standards were adopted after deficiencies such as driveways were built.

### 5.2.B Intelligent Transportation Systems

Intelligent Transportation Systems (ITS) refers to transportation systems which apply emerging hard and soft information system technologies to address and alleviate transportation congestion problems. ITS can be subdivided into three categories: Advanced Traveler Information Systems (ATIS), Advanced Traffic Management Systems (ATMS), and Advanced Vehicle Control Systems (AVCS). The ITS strategies that can help SR-73 function more efficiently include updating signal timing plans and coordinating signalized intersections.

## 5.3 Improve Safety

### 5.3.A Reduce Crash Rates

The rate of accident occurrence on this corridor may be reduced by:

1. Improving intersection operation by ensuring proper striping, signing, and signal timing.
2. Posting signs warning drivers about heavy truck traffic entering and exiting near Fairfield at 1540 North.
3. Installing warning signs for wildlife at various locations.
4. Paving shoulders, adding rumble strips, and improving clear zones by reducing the slope to reduce roadway departure crashes and the severity of roadway departure crashes.

### 5.3.B Turn Lanes

Turn lanes improve safety by reducing conflicts between motorists at intersections. Turn lanes exist at virtually all of the intersections along SR-73.

### 5.3.C Intersections

There are two major intersections of concern on this corridor. The first one is located at 1540 North and SR-73 in Fairfield. For turf hauling semi-trucks, turning from 1540 North onto SR-73 is very difficult and potentially dangerous because they have to pull into the other lane of travel to make the turn. The second intersection of concern is Faust Road as it comes into SR-73. The intersection is skewed, making it very difficult for a driver on Faust Road to see eastbound traffic on SR-73.

### 5.3.D Bike Lanes

Shoulders could be paved in Segment 1 (milepost 0.0 to milepost 20.86) for bike use. In Segments 2 and 3, shoulders could be widened from four feet to 10 feet to provide ample space for bike use.

## 5.4 Increase Capacity

### 5.4.A Travel Demand Management

Travel Demand Management (TDM) is the planning and implementation of programs that seek to reduce road space demand by influencing travel choices and the amount and timing of travel. TDM aims to encourage more walking, cycling, public transit use, car-pooling, and tele-commuting. The following strategies can help reduce demand for space on SR-73:

1. Accommodate bikes consistently with UDOT policies and plans.
2. As residential and commercial development occurs along the frontage of SR-73 between milepost 30.76 and milepost 36.46, install sidewalks to provide pedestrian access.

### 5.4.B Additional Highway Capacity

Table 14 presents a draft of the Mountainland Association of Governments (MAG) major capacity improvement priorities. Preliminary right-of-way analysis has also shown that there is enough right-of-way for the proposed planned widening.

<b>Table 14 – MAG Major Capacity Improvement Priorities</b>				
Project	Beg MP	End MP	Phase and Year	Estimated Cost <sup>^</sup>
<b>Segment 2</b>				
Widen to 4 lanes	26.22	30.22	3 2025-2030	\$62,500,000
<b>Segment 3</b>				
Widen to 4 lanes	33.22	35.62	1 2007-2015	\$18,700,000
Widen to 4 lanes	30.22	33.22	2 2015-2025	\$42,000,000
Convert to 6 lane expressway	33.22	35.72	4 Beyond 2030	Unfunded

<sup>^</sup>Estimated cost is inflated to middle of phase

#### 5.4.C Transit

The study area is not currently served by transit. Mountainland Association of Governments Regional Transportation Plan shows no transit along SR-73 in the future. However, bus transit is proposed to serve Eagle Mountain City on Pony Express Parkway in Phase 1 – 2007-2015.

## 6 LIST OF RECOMMENDED PROJECTS AND COST ESTIMATES

The objective of this study was to identify existing deficiencies and future corridor operational, capacity, and geometric characteristics that will become needs in the future. Another objective was to develop a list of improvement projects that will enhance the performance of the corridor. After analyzing the existing conditions and future requirements on SR-73, InterPlan recommends that the improvements presented in Table 15 be implemented. This list also includes existing projects contained in the system preservation plan.

Table 15 – Recommended Improvement Projects				
Project	Begin MP	End MP	Year	Cost Estimate
Segment 1				
1. Install safety improvements^ <ul style="list-style-type: none"> <li>• Stripe shoulders (for bike lanes) and travel lanes</li> <li>• Install better slope easement</li> <li>• Install wildlife warning signs</li> <li>• Lighting</li> </ul>	0.0	20.86	2008	\$6,800,000
2. Pave shoulders to 10 feet^	0.0	20.86	2008	\$39,000,000
3. Minor asphalt rehabilitation*	15.79	20.86	2012	\$1,199,429
4. Major asphalt rehabilitation *	8.70	15.79	2015	\$5,004,220
5. Major asphalt rehabilitation *	0.0	8.70	2017	\$7,449,580
6. Chip seal*	15.79	20.86	2020	\$379,850
Segment 2				
1. Crack sealing and pothole patching (where necessary – assume 20% )^	20.86	30.76	2007	\$646,000
2. Install safety improvements^ <ul style="list-style-type: none"> <li>• Stripe shoulders for bike lanes and travel lanes</li> <li>• Install better slope easement</li> <li>• Install lighting</li> </ul>	20.86	30.76	2008	\$3,172,000
3. Widen shoulders from 4 feet to 10 feet^	20.86	26.22	2008	\$ 8,187,000
4. Minor asphalt rehabilitation*	20.86	21.04	2012	\$42,583
5. Minor asphalt rehabilitation*	21.05	25.04	2013	\$1,315,985
6. Chip seal*	25.04	30.76	2013	\$470,217
7. Repair culvert*	25.04	31.10	2015	\$195,716
8. Chip seal*	20.86	21.04	2020	\$13,485
Segment 3				
1. Chip seal*	30.76	31.10	2013	\$27,949
2. Minor asphalt rehabilitation*	31.10	34.54	2013	\$1,416,989
3. Functional repair*	34.54	36.45	2013	\$838,942

\*UDOT System Preservation Plan 2011-2020.

^InterPlan's Estimate Using UDOT's Statewide Standard Item Average Prices, 2006 (See Appendix)

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## 8 APPENDIX

<b>Appendix 8A – Annual Average Daily Traffic (AADT)</b>						
Year	Segment 1		Segment 2		Segment 3	
	(mp 0.0-mp 20.86)		(mp 20.86-mp 30.76)		(mp 30.76-mp 36.46)	
	AADT	Forecast	AADT	Forecast	AADT	Forecast
1985	557		763		2500	
1986	563		775		2535	
1987	570		788		2570	
1988	523		728		1773	
1989	530		740		1478	
1990	665		860		2445	
1991	672		1023		2975	
1992	1108		1343		3268	
1993	1150		1393		3385	
1994	853		995		2463	
1995	865		995		2940	
1996	865		1030		3040	
1997	902		1073		3163	
1998	1375		1353		4061	
1999	1427		1403		4256	
2000	1413		1705		4008	
2001	1367		3188		11520	
2002	1328		3820		11473	
2003	1307		3755		11268	
2004	2005		5538		18960	
2005	2100		5715		20305	
2006		2336		7006		22093
2007		2572		8298		23881
2008		2808		9589		25668
2009		3044		10881		27456
2010		3280		12172		29244
2011		3516		13463		31032
2012		3752		14755		32820
2013		3988		16046		34607
2014		4224		17338		36395
2015		4460		18629		38183
2016		4696		19920		39971
2017		4932		21212		41759
2018		5168		22503		43546
2019		5404		23795		45334
2020		5640		25086		47122
2021		5876		26377		48910
2022		6112		27669		50698
2023		6348		28960		52485
2024		6584		30252		54273
2025		6820		31543		56061
2026		7056		32834		57849
2027		7292		34126		59637
2028		7528		35417		61424
2029		7764		36709		63212
2030		8000		38000		65000

<b>Appendix 8B – Accident Data Analysis for SR-73</b>							
Segment		2002			2003		
Beg MP	End MP	# of Accidents	AADT	Accident Rate	# of Accidents	AADT	Accident Rate
0.00	3.42	3	2,065	1.16	2	2,030	0.79
3.42	15.52	20	960	4.72	11	945	2.64
15.52	20.86	9	960	4.81	9	945	4.89
<b>Weighted Average Values (Segment 1, mp 0.0 – mp 20.86)</b>			<b>1141.16</b>	<b>4.16</b>		<b>1122.89</b>	<b>2.91</b>
20.86	24.87	5	2,395	2,355	2.03	2,355	2.03
24.87	30.76	21	5,245	5,155	1.35	5,155	1.35
<b>Weighted Average Values (Segment 2, mp 20.86 – mp 30.76)</b>			<b>4090.61</b>	<b>1.69</b>		<b>4020.86</b>	<b>1.63</b>
30.76	36.46	42	11,170	10,970	3.55	10,970	3.55
<b>Weighted Average Values (Segment 3, mp 30.76 – mp 36.46)</b>			<b>11,170</b>	<b>1.81</b>		<b>10,970</b>	<b>3.55</b>

<b>Appendix 8C – Accident Data Analysis for SR-73</b>							
Segment		2004			2005		
Beg MP	End MP	# of Accidents	AADT	Acc. Rate	# of Accidents	AADT	Acc. Rate
0.00	3.42	7	2,595	2.16	3	2,680	0.90
3.42	15.52	15	1,710	1.99	19	1,855	8.21
15.52	20.86	7	1,710	2.10	7	1,765	3.18
<b>Weighted Average Values (Segment 1, mp 0.0 – mp 20.86)</b>			<b>1855.10</b>	<b>2.04</b>		<b>1967.22</b>	<b>5.72</b>
20.86	24.87	9	3,120	1.97	5	3,220	1.24
24.87	30.76	35	7,955	2.05	13	8,210	1.27
<b>Weighted Average Values (Segment 2, mp 20.86 – mp 30.76)</b>			<b>5996.58</b>	<b>2.02</b>		<b>6188.80</b>	<b>1.26</b>
30.76	36.46	72	16,400	2.11	80	17,545	3.65
<b>Weighted Average Values (Segment 3, mp 30.76 – mp 36.46)</b>			<b>16,400</b>	<b>2.11</b>		<b>17,545</b>	<b>3.65</b>

Appendix 8D – Cost Estimates for SR-73					
ITEM	COST	UNIT	QUANTITY PER LINEAR FOOT		COST PER LINEAR FOOT OF ROADWAY
Clearing and Grubbing	\$0.13	Ft <sup>2</sup>	20*1	20.0	\$ 2.60
Roadway Excavation (6" thick Subgrade)	\$0.36	Ft <sup>3</sup>	20*(6/12)*1	10.0	\$ 3.60
Subgrade Compaction and Finishing	\$0.10	Ft <sup>2</sup>	20*1	20.0	\$ 2.00
Untreated Base Course - 3/4" or 1" Max (10" thick)	\$1.15	Ft <sup>3</sup>	20*(10/12)*1	16.7	\$ 19.17
Hot Mix Asphalt - 3/4" (4" thick)	\$3.84	Ft <sup>3</sup>	20*(4/12)*1	6.7	\$ 25.60
Hot Mix Asphalt - 1/2" (2" thick)	\$3.69	Ft <sup>3</sup>	20*(2/12)*1	3.3	\$ 12.30
Pavement Marking Paint	\$2.45	Ft	2*1	2.0	\$ 4.90
Curb and Gutter	\$36.40	Ft	2*1	2.0	\$ 72.80
Landscaping & Grading (4' wide)	\$0.09	Ft <sup>2</sup>	4*2*1	8.0	\$ 0.72
	Subtotal				\$ 143.69
Signs (New)	calculated @ 1.5% of subtotal				\$ 2.16
Drainage (Including Structures)	calculated @ 20% of subtotal				\$ 28.74
	Subtotal				\$ 174.58
Mobilization and Temporary Traffic Control	calculated @ 15% of subtotal				\$ 26.19
Contingency	calculated @ 20% of subtotal				\$ 34.92
	Subtotal				\$ 235.68
Engineering, construction, management, drainage & utilities	calculated @ 40% of subtotal				\$ 94.27
Contingency for Price Increases	calculated @ 10% of subtotal				\$ 23.57
TOTAL COST PER LINEAR FOOT					\$ 353.52
COST OF PAVING SHOULDERS FROM MILEPOST 0.0 TO MILEPOST 20.86					\$ 38,937,032.31

**Pave shoulders**

Right of way required: 20' (10' shoulders)

ITEM	COST	UNIT	QUANTITY PER LINEAR FOOT		COST PER LINEAR FOOT OF ROADWAY
Pavement Marking Paint	\$2.45	Ft	5*1	5.0	\$ 12.25
Slope Easement	\$0.36	Ft³	12*4*1	48.0	\$ 17.28
				Subtotal	\$ 29.53
Signs (New)	calculated @ 1.5% of subtotal				\$ 0.44
New and Reconstructed Lighting	calculated @ 1.5% of subtotal				\$ 0.44
	Subtotal				\$ 30.42
Mobilization and Temporary Traffic Control	calculated @ 15% of subtotal				\$ 4.56
Contingency	calculated @ 20% of subtotal				\$ 6.08
	Subtotal				\$ 41.06
Engineering, construction, management, drainage & utilities	calculated @ 40% of subtotal				\$ 16.42
Contingency for Price Increases	calculated @ 10% of subtotal				\$ 4.11
TOTAL COST PER LINEAR FOOT					\$ 61.59
TOTAL COST OF SAFETY IMPROVEMENTS FROM MILEPOST 0.0 TO MILEPOST 20.86					\$ 6,783,764.63

ITEM	COST	UNIT	QUANTITY PER LINEAR FOOT		COST PER LINEAR FOOT OF ROADWAY
Pavement Marking Paint	\$2.45	Ft	5*1	5.0	\$ 12.25
Slope Easement	\$0.36	Ft³	12*4*1	48.0	\$ 17.28
				Subtotal	\$ 29.53
New and Reconstructed Lighting	calculated @ 1.5% of subtotal				\$ 0.44
	Subtotal				\$ 29.97
Mobilization and Temporary Traffic Control	calculated @ 15% of subtotal				\$ 4.50
Contingency	calculated @ 20% of subtotal				\$ 5.99
	Subtotal				\$ 40.46
Engineering, construction, management, drainage & utilities	calculated @ 40% of subtotal				\$ 16.19
Contingency for Price Increases	calculated @ 10% of subtotal				\$ 4.05
TOTAL COST PER LINEAR FOOT					\$ 60.70
TOTAL COST OF SAFETY IMPROVEMENTS FROM MILEPOST 20.86 TO MILEPOST 30.76					\$ 3,172,660.74

ITEM	COST	UNIT	QUANTITY PER LINEAR FOOT		COST PER LINEAR FOOT OF ROADWAY
Clearing and Grubbing	\$0.13	Ft <sup>2</sup>	6*2*1	12.0	\$ 1.56
Roadway Excavation (6" thick Subgrade)	\$0.36	Ft <sup>3</sup>	6*2*(6/12)*1	6.0	\$ 2.16
Subgrade Compaction and Finishing	\$0.10	Ft <sup>2</sup>	6*2*1	12.0	\$ 1.20
Untreated Base Course - 3/4" or 1" Max (10" thick)	\$1.15	Ft <sup>3</sup>	6*2*(10/12)*1	10.0	\$ 11.50
Hot Mix Asphalt - 3/4" (4" thick)	\$3.84	Ft <sup>3</sup>	6*2*(4/12)*1	4.0	\$ 15.36
Hot Mix Asphalt - 1/2" (2" thick)	\$3.69	Ft <sup>3</sup>	6*2*(2/12)*1	2.0	\$ 7.38
Pavement Marking Paint	\$2.45	Ft	2*1	2.0	\$ 4.90
Curb and Gutter	\$36.40	Ft	2*1	2.0	\$ 72.80
Landscaping & Grading (4' wide)	\$0.09	Ft <sup>2</sup>	4*2*1	8.0	\$ 0.72
	Subtotal				\$ 17.58
Signs (New)	calculated @ 1.5% of subtotal				\$ 1.76
Drainage (Including Structures)	calculated @ 20% of subtotal				\$ 23.52
	Subtotal				\$ 142.86
Mobilization and Temporary Traffic Control	calculated @ 15% of subtotal				\$ 21.43
Contingency	calculated @ 20% of subtotal				\$ 28.57
	Subtotal				\$ 192.86
Engineering, construction, management, drainage & utilities	calculated @ 40% of subtotal				\$ 77.14
Contingency for Price Increases	calculated @ 10% of subtotal				\$ 19.29
TOTAL COST PER LINEAR FOOT					\$ 289.29
COST OF WIDENING SHOULDERS FROM MILEPOST 20.86 TO MILEPOST 26.22					\$ 8,186,932.26

**Widen shoulders from 4' to 10'**

Right of way required: 12'

ITEM	COST	UNIT	QUANTITY PER LINEAR FOOT		COST PER LINEAR FOOT OF ROADWAY
Pothole Patching	\$24.27	Ft <sup>2</sup>	1*1	1.0	\$ 24.27
Crack Sealing	\$6.25	Ft	1	1.0	\$ 6.25
				Subtotal	\$ 30.52
Mobilization and Temporary Traffic Control	calculated @ 15% of subtotal				\$ 4.58
Contingency	calculated @ 20% of subtotal				\$ 6.10
	Subtotal				\$ 41.20
Engineering, construction, management, drainage & utilities	calculated @ 40% of subtotal				\$ 16.48
Contingency for Price Increases	calculated @ 10% of subtotal				\$ 4.12
TOTAL COST PER LINEAR FOOT					\$ 61.80
COST OFCRACK SEALING AND POTHOLE REPAIR FROM MILEPOST 20.86 TO MILEPOST 30.76					\$ 646,088.56